

MPM developments in soil-water-structure interaction implemented in Anura3D

Francesca Ceccato*, Alexander Chmelniczki[†], Alba Yerro^{††} and Mario Martinelli^{†††}

* Department of Civil, Environmental and Architectural Engineering (DICEA)
Università degli Studi di Padova (UNIPD)
Via ognissanti 39, 35129, Padova, Italy
Email: francesca.ceccato@dicea.unipd.it

[†] Hamburg University of Technology,
Institute of Geotechnical Engineering and Construction
Management, Harburger Schlossstrasse 20, 21079 Hamburg, Germany
Email: alexander.chmelniczki@tuhh.de

^{††} Department of Civil and Environmental Engineering, Virginia Tech
111-A Patton Hall, Blacksburg, 24060 VA, US
Email: ayerro@vt.edu

^{†††} Geo-Engineering Unit, Deltares, Delft, the Netherlands
Boussinesqweg 1, 2629 HV Delft, 2629 HV Delft, 2600 MH Delft
Email: Mario.Martinelli@deltares.nl

ABSTRACT

Many geotechnical problems involve large deformations, non-linear material behaviour, soil-structure interactions, and multiphase (solid, liquid, gas) interactions, which poses significant challenges for numerical simulations. The material point method (MPM) showed to be well suited to study slope instabilities, such as landslides [1], earth embankment and levee failures [2,3], underground excavations [4], explosions, soil-penetration problems, such as pile installation [5], Cone Penetration Testing [6,7], Free Fall Penetrometer testing [8], etc. Moreover, erosion and sedimentation problems require considering phase transitions (from solid-like to fluid-like), and

This contribution will show the latest numerical developments of MPM with respect to the above-mentioned aspects as implemented in the open-source software Anura3D. Particular attention is given to some geotechnical applications, such as the simulation of slope collapse due to earthquake or water pressure changes, erosion problems, porous sea defences, installation problems, and many more.

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